

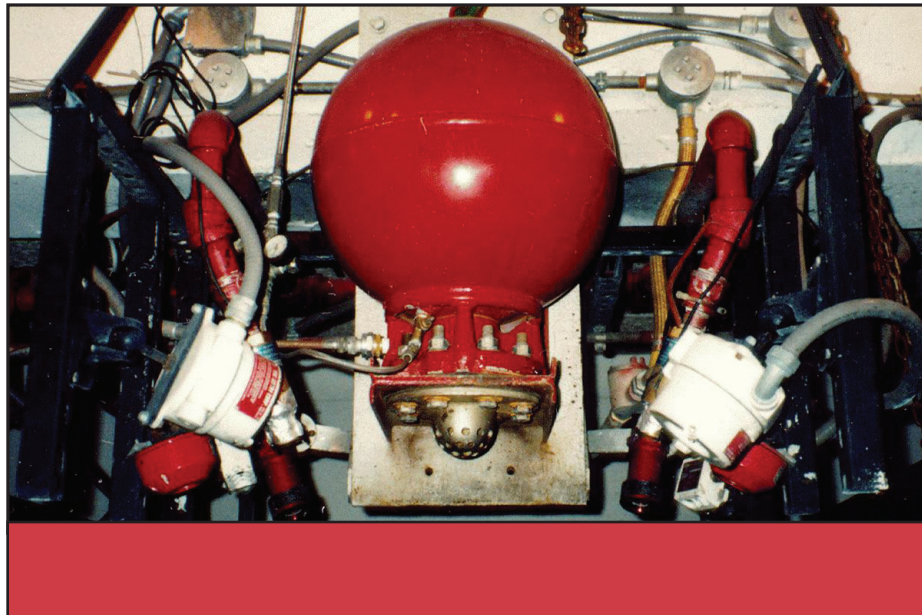


Air Force Research Laboratory | AFRL

Science and Technology for Tomorrow's Aerospace Forces

Success Story

NEW SUPPRESSION SYSTEM EXTINGUISHES FIRE IGNITION IN MILLISECONDS



Munitions workers will soon be able to conduct inherently dangerous tasks while protected by a fire suppression system that is both faster than and superior to previous technologies. This system enhances productivity and virtually eliminates current environmental contamination hazards caused by accidental system discharges. Engineers conducted first-time electromagnetic radiation measurements of pyrotechnic and propellant materials and provided this information to commercial high-speed optical detector manufacturers to further develop/improve their detectors.



Air Force Research Laboratory
Wright-Patterson AFB OH

Materials & Manufacturing
Emerging Technologies

Accomplishment

Engineers at the Materials and Manufacturing Directorate's Fire Research Laboratory developed a fire protection device that responds to a propellant or pyrotechnic munitions fire in four to eight milliseconds. More than ten times faster than current Department of Defense standards, this Advanced Fire Protection Deluge System (AFPDS) will save lives, reduce injuries, and save millions of dollars in property damage at munitions manufacturing and surveillance facilities.

Background

Hazardous, flammable, and explosive materials pose a significant risk in military plants that produce, maintain, and renovate munitions. The US Army Operations Support Command and the private sector have suffered severe loss of life and property damage due to related incidents. Their facilities also encounter false alarms from the reaction of fire suppression systems' ultraviolet detectors to non-threatening catalysts in the area of detection.

At the request of the Army Defense Ammunition Logistics Activity, the directorate's Fire Research Group at Tyndall AFB, Florida, examined speed, effectiveness, and false alarm concerns with the Army's existing high-speed deluge fire protection systems. Directorate engineers developed and tested the AFPDS using an electronically integrated combination of commercially available high-speed, false alarm-immune optical fire detectors, a controller operating at less than a millisecond, and pressurized water expelled in small particles from high rate discharge spheres.

Although the system extinguished over 99% of more than 200 burns (test fires) in the stand-alone mode, the engineers provided backup—pressurized water for a few additional seconds from standard nozzles. This test proved the system useable as a stand-alone suppression device or as a complement to existing systems without replacing the current deluge systems.

To date, the system has successfully detected and extinguished test fires from 17 pyrotechnic, high-explosive, and propellant materials. Each of the system's multi-spectrum detectors also performed superbly against a host of directorate-created false alarm sources similar to those found in plants and arsenals. In the remote chance of activation, the AFPDS expels only two to five gallons of water compared to current systems that use up to 15,000 gallons, virtually eliminating environmental runoff problems.

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTT, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (01-ML-13)